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M – 00251 | Review Article

Comprehensive Overview of REDD+ in India: Status, Opportunities and Challenges

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Abstract

Climate change is a worldwide issue with detrimental effects on ecosystems and human well-being. Reducing Emissions from Deforestation and Forest Degradation (REDD) is a worldwide policy tool for combating climate change by reducing emissions from the forestry sector and has received widespread attention. Since the program's inception, India has been a strong advocate for REDD+ and its activities. The goal of this research is to evaluate India's current REDD+ readiness. India is the fourth largest CO_2 emitter in the world, accounting for 7% of global CO_2 emissions. India's emission trajectory shows the country's ever-increasing CO_2 emission trend, with an annual average increase rate of 5-6 percent. India has a large geographical area and forest cover, and it holds 7,124.6 million tons of carbon stock. Forests are traditionally managed through a participatory approach, which is similar to REDD+ activities. India has made significant progress toward REDD+ implementation by developing a national REDD+ strategy, enacting consistent laws and regulations, and demonstrating accountability and monitoring of national forest carbon. However, several issues, including forest dependency, community rights, capacity building, policies, and finance, should be carefully addressed to overcome hurdles in REDD+ implementation.

Keywords

Carbon stock; Participatory approach; Forest dependency; Community rights

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Introduction

Climate change is a worldwide phenomenon with negative consequences for ecosystems and human well-being. It is defined as "a change in the condition of the climate that may be recognized by changes in the mean and/or variability of its attributes over time, generally decades or more" (IPCC, 2007). Both natural and human processes cause climate change. Forest fires, earthquakes, volcanoes, and permafrost are examples of natural processes (Yue and Gao, 2018), whereas human processes include activities linked to energy generation, industrial activities, and land use, land-use change, and forestry (LULUCF) (Edenhofer *et al*., 2014). The rise in greenhouse gas (GHG) concentrations in the atmosphere as a consequence of human activity is the major cause of climate change. Carbon dioxide (CO_2), methane (CH_4), Nitrous Oxide (N_2O), and Chlorofluorocarbons (CFCs) are the main GHGs (UNFCCC, 2008). These GHGs have a major role in global warming (IPCC, 1996), with CO_2 accounting for nearly 60% of total global warming (Chand *et al*., 2018; Sahu *et al*., 2015). Between 1984 and 2019, CO_2 and CH_4 rose by 19% and 13%, respectively (Cail and Criqui, 2021). The continuous increases in these GHGs due to human activities will hasten global warming and speedup disasters like erratic rainfall, flood, changing rainfall patterns, drought, and drying water sources (IPCC, 2014). Anthropogenic activities have already caused global warming of 1.0°C over pre-industrial levels. If the current emission rate persists, global warming is projected to surpass 1.5°C by 2050 (IPCC, 2018).

The UNFCCC (United Nations Framework Convention on Climate Change) achieved an agreement at the COP3 (Conference of Parties) to minimize the potential effects of climate change, known as the Kyoto Protocol. Under Kyoto Protocol, forests are regarded essential for their carbon sinks' role because they can capture and store CO_2 from the atmosphere (Bohara *et al*., 2018). The Kyoto Protocol is a pact aiming to decrease GHGs. It was signed in 1997 and ratified on 16th February 2005. The Protocol's goals are to keep GHG levels in the atmosphere constant at a level that avoids detrimental human impact on the climate system (UNFCCC, 2005). During the first commitment period of the Kyoto Protocol (2008-2012), the Parties pledged to reduce their GHG emissions by an average of 5% compared to 1990 levels. An amendment to the Kyoto Protocol was accepted at the Doha climate change conference in 2012 to bridge the gap between the end of the first Kyoto phase in 2012 and the start of the new global agreement (the Paris Agreement) in 2020. In this amendment, participating countries agreed to cut their GHG emissions by at least 18% below 1990 levels during the second commitment period (2013-2020). The Kyoto Protocol has proposed three different flexibility options for nations to meet the emission reduction goal: Joint Implementation (JI), Clean Development Mechanism (CDM), and Emission Trading (ET). Under CDM, the carbon services of the forests were enlisted, and records on emissions from LULUCF activities were maintained (Sud *et al*., 2012). Since COP3, the term "avoided deforestation" has been used to refer to decreasing emissions from deforestation in underdeveloped nations. During the International Conference in Marrakesh in 2001, the concept of avoided deforestation was dropped, leaving afforestation and reforestation as permissible CDM project activities. It was due to fear of undercutting Annex-I nation's[1] efforts to reduce fossil fuel emissions and flooding the market with large carbon credits from the forestry sector. However, during COP11 in Montreal in 2005, the Coalition of Rainforest Nations, headed by Costa Rica and Papua New Guinea, established RED (Reducing Emission from Deforestation) to limit deforestation (UNFCCC, 2005). RED occurred when the Kyoto Protocol was signed, which aimed to reduce emissions from technological projects. REDD (Reducing Emissions from Deforestation and Forest Degradation) emerged at COP13 in Bali, Indonesia, in 2007, when deforestation and forest degradation were seen as equal threats to the Protocol's emission reduction promise. Following that, at COP14 in Poland in 2008, the addition of "+" to REDD was agreed. The evolution of REDD+ is shown in figure 1.

[1] https://unfccc.int/process/parties-non-party-stakeholders/parties-convention-and-observer-states?field_national_communications_target_id%5B515%5D=515

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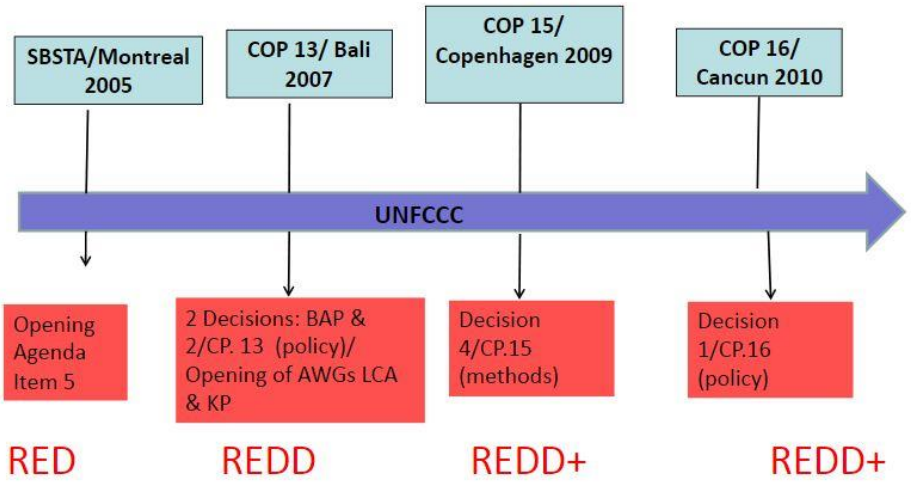

Figure 1: Evolution of REDD+

Since its debut, REDD+ has received much attention in international forums (Seymour and Busch, 2016). REDD+ is a global policy tool created by the UNFCCC to address climate change by decreasing emissions from the forestry sector. The forestry sector accounts for approximately 9-11 percent of the total GHG emissions, or about 5.8 Gt CO_2 equivalents per year, mostly in poor and tropical countries (IPCC, 2014). However, REDD+ includes biodiversity conservation and improved rural livelihoods in addition to stopping deforestation and forest degradation (Caplow *et al*., 2011; Turnhout *et al*., 2016). The official definition of REDD+ by the UNFCCC is "*reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries*" (Olander, 2012; UNFCCC, 2011). REDD+ is probably the most potent means to tackle climate change globally (Stern, 2007). It has the highest potential to reduce emissions from AFOLU (Agriculture, Forestry, and Other Land Use) (IPCC, 2014).

India's proposal to incorporate compensation for forest protection in forest-based mitigation measures was accepted at COP12 in Nairobi, Kenya. India has been a strong proponent of REDD+ and actively participates in high-level climate change discussions. India ranks 10th amongst the most forested nations of the world (FAO, 2020). The total forest cover in India is 712249 sq km (21.67% of the total geographical area), and 95,027 sq km of tree cover or tree outside the forest (2.89% of total geographical area) (IFSR, 2019). However, the National Forest Policy of 1988 envisages achieving 33 percent of forest and tree cover. An additional land area of 29.58 million hectares needs to be brought under the tree-cover through various programs like National Afforestation Programme, Green India Mission, National Agroforestry Policy, National Green Highway Mission etc. to achieve the targets mentioned in National Forest Policy. Also, more than 40 percent of forest is degraded or understocked (Aggarwal *et al*., 2009) and needs restoration efforts. With the available technical and institutional capabilities for Forest Management, India is well-positioned to benefit from REDD+ activities. In this context, the current research explores India's current REDD+ readiness.

Global GHG Emitters

China (28%) is the world's biggest GHG emitter, followed by the United States (15%), the European Union (9%), and India (7%). They account for nearly 60 percent of the global GHG emissions (Cail and Criqui, 2021). Between 1990 and 2019, China and India increased their global emission share, while the United States and the European Union decreased. Figure 2 depicts the four jurisdictions' share of global emissions from 1990 to 2019. China and India increased their global emission share from 11 to 28 percent and 3 to 7 percent, respectively. This has largely been attributed to increased global coal consumption (Olivier *et al*.,

2020). On a per capita basis, India's emissions are 70% below the world average (Bhattacharya and Mehra, 2021). Forests neutralize 11% of India's GHG emissions. The emission shares of the United States and the European Union have decreased over the same period, falling from 23 to 15 percent and 20 to 9 percent, respectively (Cail and Criqui, 2021).

India is the fourth-largest CO_2 emitter in the world. India contributed roughly 7 percent of total global greenhouse gas emissions. Cail and Criqui (2021) opined that with the current trends and Indian economy, reliance on coal for energy will further increase CO_2 footprint of India. The Government of India in its Climate Action Plan for post 2020 as per National Determined Contribution to the UNFCCC, has pledged to reduce the emissions intensity of its gross domestic product by 33 to 35 percent by 2030 from 2005 level. Also, India aims to achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 with the help of transfer of technology and low-cost international finance including from Green Climate fund, thus addressing the issue of emission from industry and energy sector.

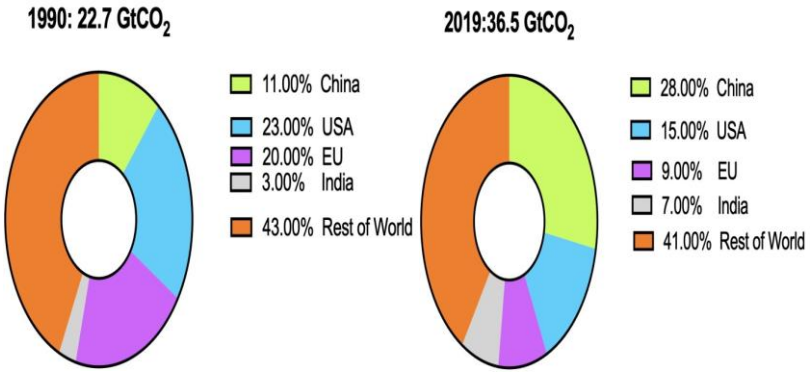

Figure 2: Global emission share by different jurisdictions in 1990 and 2019

Forest and Carbon stock status of India

India is one of the world's 17 mega biodiversity nations. India's forests cover 21.54 percent of its land area (FSI, 2019), accounting for 1.8 percent of the world's forest area (FAO, 2020). Similarly, it also harbors 8 percent of the total world's flora in 5 major and 16 sub-major forest types as classified by Champion and Seth (1968). Of these forest types, tropical forests alone share 83 percent (Suganthi *et al.,* 2017) and are the major reservoir of carbon in the country.

From 1995 to 2019, carbon stocks in India's forests are estimated to have increased from 6245 million tons to 7124.6 million tons (FSI, 2019). The soil organic pool was the biggest, accounting for about 56 percent of the total, followed by the aboveground carbon pool(31%)(FSI, 2019). By 2030, India has committed to increase the carbon stock by 2.5- 3.0 billion tons via increasing forest and tree cover under the Intended Nationally Determined Contribution (INDC). In 2010, India submitted a national report to the UNFCCC, illustrating the change in carbon stocks from 1994-95 to 2004-05. The carbon stock change in Indian forests revealed a progressive, positive change in the following period (1995-2019) as shown in figure 3.

Deforestation and Forest Degradation

Deforestation and forest degradation have been major contributors to global GHG emissions (Le Quéré *et al*., 2018). They are responsible for up to 25 percent of the total annual GHG emissions (IPCC, 2014; Le Quéré *et al*., 2015; Pendrill *et al.*, 2019). Anthropogenic activities result in the addition of 42 billion tons of CO_2 every year (IPCC, 2018) and have already added about 600 giga tons of carbon to the atmosphere since 1870 (Federici *et al*., 2018).

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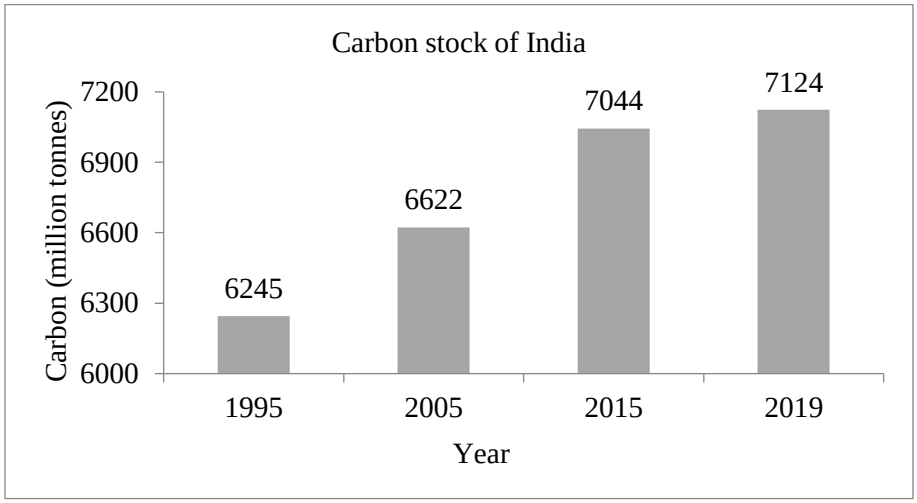

Figure 3: Carbon stock of India (1995-2019)

Agriculture, Forestry, and Other Land Use (AFOLU) activities have contributed nearly 23 percent of total net anthropogenic emissions from 2007-16 (IPCC, 2019). Since the Rio Summit of 1992, 250 million hectares of tropical forests have been diverted for agriculture (Neupane, 2015). Deforestation decreased from 12 million hectares to 10 million hectares between 2010 and 2015 (FAO, 2020). However, emissions from forest degradation rose by one-third during the same period (FAO, 2015). In India, deforestation is not much problem (Singh *et al*., 2015). According to research, forest degradation shares about 2.1 billion tons of CO_2 emissions every year in 74 developing nations (Pearson *et al*., 2017). It is estimated that anthropogenic activities at this rate will increase temperature by 1°C (0.8°C to 1.2°C) (Allen *et al*., 2018; IPCC, 2018), causing severe climate problems.

To develop an effective REDD+ intervention, it is essential to address the causes of deforestation and forest degradation (Hosonuma *et al*., 2012; Kissinger *et al*., 2012; Minang *et al*., 2014; Moonen *et al*., 2016). Understanding and linking direct and indirect drivers to policy development and implementation is critical (Goetz *et al*., 2014; Tegegne *et al*., 2016; Yoshikura *et al*., 2016) to modify recent trends in forestry leading towards better climate future.

Figure 4: Elements of REDD+ (*Source*: UN-REDD, 2016)

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Elements of REDD+

For eligibility of countries to receive finance under REDD+ programme, a developing country must have accepted documents of 4 key elements of REDD+ as given in figure 4.

REDD+ Strategy of India

One of the four major elements of REDD+ is developing a National REDD+ strategy. India has prepared its National REDD+ strategy in 2018 and submitted to UNFCCC with technical inputs from the Indian Council of Forestry Research and Education (ICFRE). This is required to be eligible for getting result-based financial incentives. India's National REDD+ Strategy lays out the conducive and enabling environment for REDD+ implementation to support multiple REDD+ accords of UNFCCC. The main goal of the REDD+ Strategy is to make it easier for the country to implement the REDD+ programme following relevant UNFCCC decisions made at the Cancun, Warsaw, and Paris COPs.

REDD+ covers trees inside forest areas as well as trees outside forests, regardless of their legal status. FSI defined forest as "all lands, more than one hectare in area, with a tree canopy density of more than 10 percent irrespective of ownership, land use and legal status. These lands may or may not be part of a designated forest area. Orchards, bamboo, and palm trees are also included." In India's REDD+ context, this definition of the forest will be used to create a national greenhouse gas inventory. The land classifications for REDD+ operations were developed based on a thorough understanding of its various components and their significance. According to the Cancun Agreements, REDD+ actions are specified and executed in three stages.

- Development of National REDD+ Strategies;
- Implementation of national policies/strategies that can strengthen and support REDD+ activities; and
- Transformation into results-oriented activities that are thoroughly assessed, reported, and validated.

REDD+ may be applied at the sub-national level to seek financial assistance for REDD+ deployment in physiographic zones that span multiple states. However, participating States would need to create sub-national Forest Reference Levels (FRL) with Forest Monitoring Systems with the technical assistance of government institutions such as the Forest Survey of India (FSI) to seek REDD+ funding.

National Forest Reference Emission Level (NFREL)

REDD+ urges developing nations to establish "National Forest Reference Emission Level (NFREL) and/or National Forest Reference Level (NFRL) or, if appropriate, as an interim measure, sub-national REL and/or RL, following the national circumstances". FREL/FRL serves as the standard for evaluating country's performance in the implementation of REDD+ activities.

India has laid significant emphasis to establishing a carbon stock reference level in forests. With the technical help of the Forest Survey of India (FSI), India submitted the NFREL to the UNFCCC in 2018, which has been technically reviewed by assessment team of the UNFCCC. The selected activity is sustainable forest management, and all five CO_2 pools were considered to formulate the country's forest reference level. India proposed FRL of 49.70 million tons of CO_2 equivalent per year, the historical average from 2000 to 2008 (MoEFCC, 2018). This reference level will be used as a baseline for carbon stock, and its increment will be monitored forward.

National Forest Monitoring System (NFMS)

The NFMS is one of the components for implementing REDD+ initiatives in developing countries (as provided in paragraph 71 of UNFCCC Decision 1/CP.16). NFMS should be versatile and expand on current systems. It should represent the phased strategy of the REDD+ implementation and enable the country's assessment of various forest types. NFMS should provide transparent, time-consistent, and appropriate information for measurement, reporting, and verification accounting for national capabilities (MoEFCC, 2018). The systems must also combine remote sensing with ground-based forest carbon measurement to estimate human greenhouse gas emissions from forests.

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Forest Survey of India (FSI) is in charge of developing the NFMS in India. FSI started assessing forest cover using LANDSAT-MSS satellite data in 1987 with an 80 meter spatial resolution. Mapping of forest cover is being done at a scale of 1:50000 with recent advancements in remote sensing methodologies. Since 1987, India has had a robust forest monitoring system that uses satellite-based remote sensing technology to detect forest and tree cover changes on a two-year cycle. FSI is using a combination of remote sensing and ground-based data to estimate carbon in India's forests using the IPCC's tier 2 and 3 approach. LISS-III data has been used with a spatial resolution of 23.5m and 1 hectare as the minimum mappable unit. India has been consistent in its assessment of forest resources. It has shown complete responsibility and monitoring of national forest carbon, which is a pre-requisite for result-based financial incentive for REDD+.

Safeguard Information System

Seven safeguards for REDD+ operations were agreed upon by COP16 (UNFCCC, 2010). The safeguards are often known as Cancun safeguards and are listed below as in COP decision 1/CP.16 of UNFCCC:

Figure 5: Seven Cancun safeguards (Source: UNFCCC, 2010)

REDD+ programmes are likely to ensure social and ecological benefits in a long-term manner, and also ensure adressal of potential risks to human and nature. UNFCCC urges the country to address and respect safeguards and develop a mechanism of Safeguard Information System (SIS) to address the potential threats to the community, environment and biodiversity. Safeguards are being addressed through a combination of forest governing structures, existing legal and institutional frameworks, and sources of information. SIS is being developed to meet its objectives as per Cancun agreement.

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Issues and Challenges for REDD+

REDD+ may enhance forest governance by spurring changes in favour of the mechanism. (Mulyani and Jepson, 2013). However, several issues and challenges have already been uttered (Angelsen, 2008; Fletcher *et al*., 2016; Phelps *et al*., 2010). Some of them, with relation to India, are as follows:

Dependence on forests

India bears a large population living around forests i.e., 173,000 forest fringe villages inhibit more than 300 million people (MoEFCC, 2018). These people are wholly/partly dependent on the forest for their livelihood. Furthermore, 27.5 percent of the overall population lives in poverty and relies on forest goods and services for a living, either directly or indirectly. The heavy reliance on the forests leads to forest degradation. REDD+ aims to reduce forest degradation, and high forest dependence may be a hurdle for the same. There is need to address forest dependence by creating alternate sources of income, value-addition of the forest produce, increasing awareness, to decrease pressure on the forest resources. Similarly, demand and supply imbalances in the market for forest products, which emerge from exploitation of forests beyond their carrying capacity (Aggarwal *et al.*, 2009) must be adequately addressed.

Community rights

REDD+ debates across the globe have been dominated by concerns about the infringement of human and community rights of forest-dependent people. Fears regarding land grabbing and invasion by elite groups can be stimulated (Larson *et al*., 2013). Inconsistency in land rights and carbon tenure resulting in inequitable benefit-sharing (Vergara-Asenjo *et al*., 217) and exclusion of overall community rights of tribals in decision-making have been major hurdles for REDD+ potential beneficiaries globally (Chhatre *et al*., 2012; Hiraldo and Tanner, 2011; Luttrell *et al*., 2013; Lyster, 2011; Sikor *et al*., 2010).

REDD+ implementation requires the absolute participation of all relevant stakeholders. Individual and community rights over forest areas are not new issues in India. The Forest Right Act, 2006[2] clearly defines the rights of individuals and communities over the forest and forest resources. The forest policy of India recognizes the rights of people and advocates participatory management of the forest. The concept of JFMC (Joint Forest Management Committee) in India was initiated in 1990s to improve the quality of the forest and the economic status of the local communities that are dependent on the forests. 22 million hectares of forests are being managed by more than 118000 JFMC's involving about 20 million people in JFM programme. JFMC provides a framework for benefit-sharing of REDD+ incentives and community inclusion in REDD+ implementation while respecting the community's rights over forest resources.

Capacity building and awareness

REDD+ success, no doubt is highly dependent upon the active participation of all relevant stakeholders. Capacity building of stakeholders towards REDD+ related issues is one of the challenges for REDD+ implementation (Rawat *et al*., 2020). Participatory forest management in India has been successful and well known all over the world. However, the REDD+ approach and its process are not well known to several stakeholders, especially forest-dependent users. Inadequate understanding of the REDD+ strategy needs a large-scale sensitization and capacity-building effort. Similarly, the capacity building of grassroots institutions and their engagement in REDD+ implementation must be adequately addressed. Along with awareness and capacity building initiatives, the strong benefit-sharing mechanism needs to be expressly specified. Along with awareness and capacity building initiatives, the robust benefit-sharing mechanism needs to be expressly specified. Regular training and capacity building programmes are organized for

[2] https://tribal.nic.in/FRA/data/FRARulesBook.pdf

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officers and frontline forest staffs on REDD+ MRV, a programme for capacity building of State Forest Departments for Developing State REDD+ Action Plan has also been initiated by ICFRE.

Acts and Policies

India is one of the few countries that have increased its forest and tree cover (24.56%), gradually aiming toward fulfilling the goal of national forest policies. According to the latest Indian State of Forest Report (IFSR) of 2019, the forest and tree cover at the national level increased by 5,188 square kilometers (0.56%) compared to the ISFR report of 2017. However, attaining the forest cover to 33 percent of the country's land area, according to National Forest Policy (1988)[3], is a long run.

REDD+ has been extensively debated in India since the commencement of global climate change negotiations. India supports the success of REDD+ implementation through JFM programmes and other participatory approaches. The participatory approach has been very effective in engaging people in forest management, and it could be a significant factor for REDD+ success in the country (MoEFCC, 2018). However, there is speculation on tenurial security, institutional and financial viability, gender equality, benefit-sharing, and ownership of forest products such as NTFPs in designated areas have been raised (TERI, 2004). The National REDD+ strategy and Safeguard Information System addresses these concerns based on existing Policies, Laws, Regulations, and Act's as per the potential policy approach based on socio-environmental and technological perspectives and requirements of the country.

Several acts and legislations are formulated in the country, keeping the country's commitment at national and international conferences regarding forest conservation. Policies and acts of India that supports and uplifts REDD+ activities are Indian Forest Act (1927)[4], Wildlife Protection Act (1972)[5], Water (Prevention and Control of Pollution) Act (1974)[6], Forest Conservation Act (1980)[7], Air (Prevention and Control of Pollution) Act (1981)[8], Environment (Protection) Act (1986)[9], National Forest Policy (1988)[3], Panchayat (Extension to Scheduled Areas) Act (1996)[10], Biological Diversity Act (2002)[11], National Environment Policy (2006)[12], The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (2006)[2], National Tribunal Act (2010)[13], National Agroforestry Policy (2014)[14], National Working Plan Code (2014)[15] and National Action Plan on Climate Change (2008)[16]. The proposed National Forest Policy (2018)[17] acknowledges the need to combine climate change mitigation and adaptation measures to mitigate the hazardous effects of climate change. The draft is no such exemption that emphasizes sustainable forest management through the mechanism of REDD+. Although India has progressive policies and legislation to handle REDD+ concerns, certain modifications may be necessary in the future to meet the changing paradigm of forest management.

[3] http://asbb.gov.in/Downloads/National%20Forest%20Policy.pdf
[4] http://nbaindia.org/uploaded/Biodiversityindia/Legal/3.%20Indian%20forest%20act.pdf
[5] https://legislative.gov.in/sites/default/files/A1972-53_0.pdf
[6] https://tnpcb.gov.in/pdf_2019/WaterAct17519.pdf
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[15] https://www.forests.tn.gov.in/tnforest/app/webroot/img/document/gov-india-publication/11.pdf
[16] http://www.nicra-icar.in/nicrarevised/images/Mission%20Documents/National-Action-Plan-on-Climate-Change.pdf
[17] http://www.indiaenvironmentportal.org.in/files/file/Draft%20National%20Forest%20Policy,%202018.pdf

Finance

Multilateral organizations have assisted nations with high deforestation rates via readiness programmes such as the Forest Carbon Partnership Facility (FCPF) and the UN-REDD initiative. REDD+ financing can be done through public, private, national or international support. Over $10 billion funding has been committed for REDD+ already, almost half of it being result-oriented (Norman and Nakhooda, 2015).

The World Bank's FCPF and the bio-carbon fund have proved to be difficult for nations to participate and, while having a variety of funding sources, obtaining funds has been difficult (Streck, 2016). The main reason can be the inclusion of REDD+ credit for funding in markets. If REDD+ credits are utilized as an offset, market financing may be contentious. It has been argued ideologically that paying others to enable one to pollute is unethical. Market flooding has also been a worry, with cheap REDD+ credits could potentially reduce the market price of carbon driving out mitigation in the energy sector (Angelsen *et al*., 2012). Also, the absence of a long-term plan for meeting the monetary requirements of REDD+ nations exist. Although short-term financing is accessible, the disbursement process is often slow and cumbersome. Also, finance from private investors frequently went unnoticed due to modest carbon prices (Hamrick and Gallant, 2018). Most importantly, there is no complete uniformity in the criteria that nations must meet to get financing (Pesti *et al*., 2017). In India, lack of national and international finance are identified as the challenges for implementation of REDD+ activities (Rawat *et al*., 2020).

REDD+ funding will be raised domestically via the Green India Mission, Namami Gange Programme, Green Highway Policy, and other initiatives in India (Bhattacharya and Mehra, 2021). Budget shortfall will be communicated for support from UNFCCC and Green Climate Fund. The question remains the same as other countries have and will be facing in performing REDD+ activities in the country, i.e. availability of funds (when and where?).

Conclusion

India is the tenth most forested country on the planet. India's total forest and tree cover is estimated to be 24.56 percent of its total land area. Due to protection of forests, carbon stocks in Indian forests have been steadily increasing since 1994. Since its inception, India has been a leader in expanding the scope of REDD+ and advocating for the conservation of different ecological services. The activities of REDD+ are similar to the traditional management and conservation of forests through a participatory approach. REDD+ has gained the utmost attention from policy and decision makers. This forest-based mitigation strategy to tackle climate change issues offers a unique chance to strengthen forest conservation and sustainable management.

India has made significant progress toward REDD+ implementation by developing a national REDD+ strategy, enacting uniform laws and regulations, and demonstrating complete accountability and monitoring of national forest carbon, all of which are required for REDD+ finance. Despite having several challenges in REDD+ implementation, India is ready for the implementation of REDD+. Also, India already acknowledges the significant contribution of REDD+ processes in bringing different stakeholders of the Indian forestry sector together to protect the forests and safeguarding community rights. Overall, the government sees REDD+ as a proper tool to fetch reward for the earlier efforts of forest conservation through the provision of forest carbon services to the international community and an opportunity for a better future climate.

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Authors' Declarations and Essential Ethical Compliances

Authors' Contributions (in accordance with ICMJE criteria for authorship)

Contribution	Author 1	Author 2	Author 3	Author 4	Author 5	Author 6
Conceived and designed the research or analysis	Yes	Yes	Yes	Yes	Yes	Yes
Collected the data	Yes	Yes	Yes	No	No	No
Contributed to data analysis & interpretation	Yes	Yes	Yes	Yes	Yes	Yes
Wrote the article/paper	Yes	Yes	Yes	Yes	Yes	Yes
Critical revision of the article/paper	Yes	Yes	Yes	Yes	Yes	Yes
Editing of the article/paper	Yes	Yes	Yes	Yes	Yes	Yes
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